PB90-114703

Superfund Record of Decision (EPA Region 3): Strasburg Landfill, PA (First Remedial Action), June 1989

(U.S.) Environmental Protection Agency, Washington, DC

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Remedial Response

EPA/ROD/R03-89/074
June 1989

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EPA

Superfund Record of Decision:

Strasburg Landfill, PA

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16. Abstract (Limit: 200 words)

The Strasburg Landfill site is a 22-acre facility in western Newlin Township, Chester County, Pennsylvania. The surrounding area includes farmland and 200 homes within one mile of the site. Two creeks, Brandywine and Briar Run, flow within 0.5 mile of the site's western, southern, and eastern borders and receive surface drainage. A major aquifer underlying the landfill provides drinking water via private wells to all local residences. These private wells are as close as 720 feet to the landfill. In the spring of 1979 site owners began accepting industrial wastes and heavy metals which, by year's end, included more than 1,000 yd^3 of polyvinyl chloride wastes, 2,052 yd^3 of industrial wastes and sludge, and 35,000 gallons of heavy metal sludge. In December 1979 the State claimed that industrial wastes from the landfill caused excessive siltation of Briar Run Creek, and eight months later the State prohibited the site owners from receiving any additional industrial wastes. In 1980 sampling revealed VOC contamination in the ground water and by April 1983 leachate seeped at a rate of several gallons per minute from the southeastern portion of the landfill. After charging the site owners with operating violations and subsequently suspending their operating permit, the State ordered the landfill to be closed. As part of the closure plan, leachate was collected and stored in 5,000 gallon tanks, and the landfill was regraded and covered.
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision - Strasburg Landfill, PA
First Remedial Action
Contaminated Media: gw and leachate
Key Contaminants: VOCs (benzene, TCE), other organics (toluene, xylenes)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 42
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R03-89/074
Strasburg Landfill, PA
First Remedial Action

16. Abstract (continued)

The leachate is currently transported daily to an offsite treatment facility. Additionally, surface water runoff was directed toward a sediment pond which discharged directly into Briar Run Creek. Proposed corrective measures, however, were never completely implemented. Several seepage areas have since been observed near the landfill. One large seepage area is near the southeastern corner of the landfill. Liquid from the seep ultimately flows into a sediment pond near the eastern edge of the landfill which drains via a drainage channel towards Briar Run Creek. During heavy rainfalls the sediment pond overflows into Briar Run Creek. The State has performed analyses of seep water from Briar Run Creek and of leachate from a manhole near the sediment pond and has monitored ground water for VOCs. Three residential drinking water wells contain multiple organic compounds. The primary contaminants of concern affecting the sediment pond and ground water are VOCs including TCE and benzene, and other organics including toluene and xylenes.

The selected remedial action for this site includes leachate collection, using an interceptor drain, and offsite treatment; and provision of an alternate water supply to affected residences by installing point-of-use activated carbon treatment systems at residences with contaminated ground water above levels of concern. The estimated capital cost for the remedial action is $42,850, with estimated annual O&M costs of $4,500. Costs are based on an estimate of three residences requiring an alternate water supply.

RECORD OF DECISION

Strasburg Landfill Site
Newlin Township
Chester County, Pennsylvania

Statement of Basis and Purpose

This decision document presents the selected interim remedial actions addressing an on-site leachate seep and off-site contaminated residential wells for the Strasburg Landfill Site in Chester County, Pennsylvania. These remedial actions were developed in accordance with the Comprehensive Environmental Response, Compensation Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and to the extent practicable, the National Contingency Plan. This decision is based on the administrative record for this site. The attached index identifies the items that comprise the administrative record upon which the selection of the remedial actions are based. The Commonwealth of Pennsylvania has concurred on the selected remedies.

Description of Selected Remedy

The selected Remedial Action Alternatives (RAA) for the on-site leachate seep and for the off-site contaminated residential wells are described below.

Leachate Seep

The selected remedy for the leachate seep involves collecting the leachate and treating it off-site. The components of this remedy are summarized as follows:

- Excavate a ditch below the leachate seep approximately 25 feet long, 5 feet wide, and 2 feet deep;
- Install interceptor drain in the excavated ditch;
- Connect the interceptor drain to the existing leachate collection and storage tank system, with a 4-inch diameter solid PVC pipe, through the existing leachate collection system manhole; and
- Continue current disposal arrangements, including the transport of leachate to a RCRA authorized treatment facility.

Contaminated Water Supply

The selected remedy for the off-site contaminated residential wells involves the installation of activated carbon treatment systems at residences with contaminated water above levels of concern.

Summary of Risk and Rationale for Selection of Alternatives

A typical and a reasonable worst-case scenario was evaluated in the public health evaluation for the Strasburg Landfill site. The average concentrations of groundwater contaminants found in the residential wells were used in the typical exposure scenario. The maximum concentration found in any of the residential wells was used to represent a worst-case scenario.

Under the typical exposure scenario, no adverse noncarcinogenic health effects would be expected. However, the carcinogenic risk is calculated to be about 1 in 2,400 or 400 times greater than the 1×10^{-6} (one in a million) lifetime cancer level proposed by the EPA.

Under the reasonable worst-case scenario, noncarcinogenic adverse effects may be possible. The carcinogenic risk is calculated to be about 1 in 1,350 or 700 times greater than the EPA 1×10^{-6} proposed risk level.

The leachate seep control alternative, to collect and pipe the leachate to the existing collection and storage system, was selected because it meets established remedial action objectives with regard to human health and the environment. The components of this alternative are well demonstrated and represent a reliable and cost effective method for leachate seep collection and disposal.

The point-of-use activated carbon treatment alternative was selected because the alternative meets established remedial action objectives by providing an effective, reliable treatment method to reduce potential human health risks from ingestion, inhalation and dermal adsorption of contaminated groundwater. The treatment units are commercially available and can be installed in a short time.

Declaration

The remedy selected to address the contaminated residential drinking water is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate for this remedial action and is cost effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

The remedy selected for the leachate seep is protective of human health and the environment, attains Federal and State requirements that are applicable, relevant and appropriate and is cost effective. However, it is only a partial remedy and hazardous substances above health-based levels continue to remain on-site. Treatment of these substances are not within the limited scope of this action but will be

addressed during the Remedial Investigation/Feasibility Study. Future operable units to address these substances will meet the statutory preference for treatment and utilization of permanent solutions to the maximum extent practicable. Although this interim remedy for the leachate seep results in hazardous substances remaining on-site above health-based levels, the five-year facility review will not apply to this action.

June 29, 1989
Date

Edwin B. Erickson,
Regional Administrator
Region III

THE DECISION SUMMARY

Introduction

This Record of Decision (ROD) will summarize the findings of a Focused Feasibility Study (FFS) for the Strasburg Landfill Site that addressed an on-site leachate seep and off-site contaminated residential wells, and will present remedial measures for these two areas of concern.

Site Location and Description

The Strasburg Landfill is a 22-acre facility located on Strasburg Road in western Newlin Township, Chester County, Pennsylvania (see Figure 1). The coordinates of the site are North 39°56'35" Latitude and West 75°46'18" Longitude. The entrance road to the landfill is blocked by a locked gate, but access to the site is essentially unrestricted.

The landfill was built in a valley and the shape of the facility is roughly elliptical. Brandywine Creek is located within a half-mile of the western and southern boundaries of the facility. Briar Run Creek is located within 300 feet of the eastern boundary of the site. Briar Run Creek flows into Brandywine Creek to the south. Land use in the area is primarily residential and agricultural. There are 201 single-family residences witnin a 1-mile radius of the site. A schematic site map of the landfill is shown in Figure 2.

The topography of the area is characterized by a combination of gentle and steep hills. The highest elevation of hills south of the site in Newlin Township approaches 550 feet above Mean Sea Level (MSL). The elevation of the Brandywine Creek floodplain to the south is approximately 250 feet above MSL.

The peak elevation of the landfill is reported to be 470 feet above MSL (EPA Region III HRS 1986). The south and east sides of the landfill have a steeper slope than the north and west sides. Surface drainage from the site flows to the south and southwest toward Brandywine Creek and the east and southeast toward Briar Run.

Briar Run flows into Brandywine Creek, which is a water supply source for the Embreeville State Hospital. The water intake is approximately 4 miles downstream from the site. Brandywine Creek is also used for canoeing and tubing. The Pennsylvania Department of Environmental Resources (PADER) accepted the "1A" nomination for the Brandywine Creek, declaring that the creek exhibits several unique, outstanding, or irreplaceable values, is of statewide or national significance and has a "most urgent need for protection."

The major aquifer in a 3-mile radius around the Strasburg Landfill is contained within the Peters Creek Schist and the Wissahickon Formations. Fractures are considered to be the major feature in both formations promoting groundwater movement. The Peters Creek Schist underlies

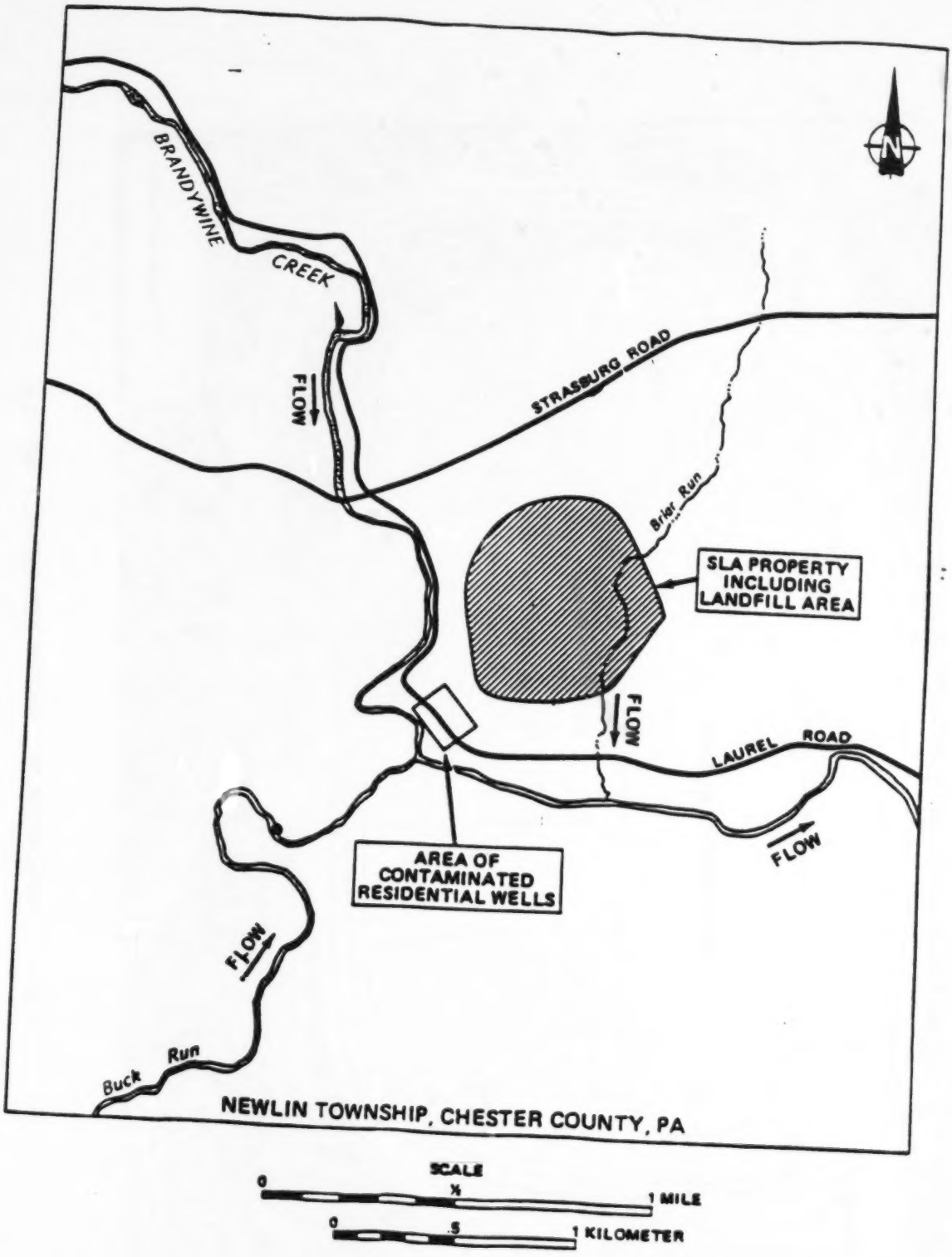

Figure 1 SITE LOCATION MAP

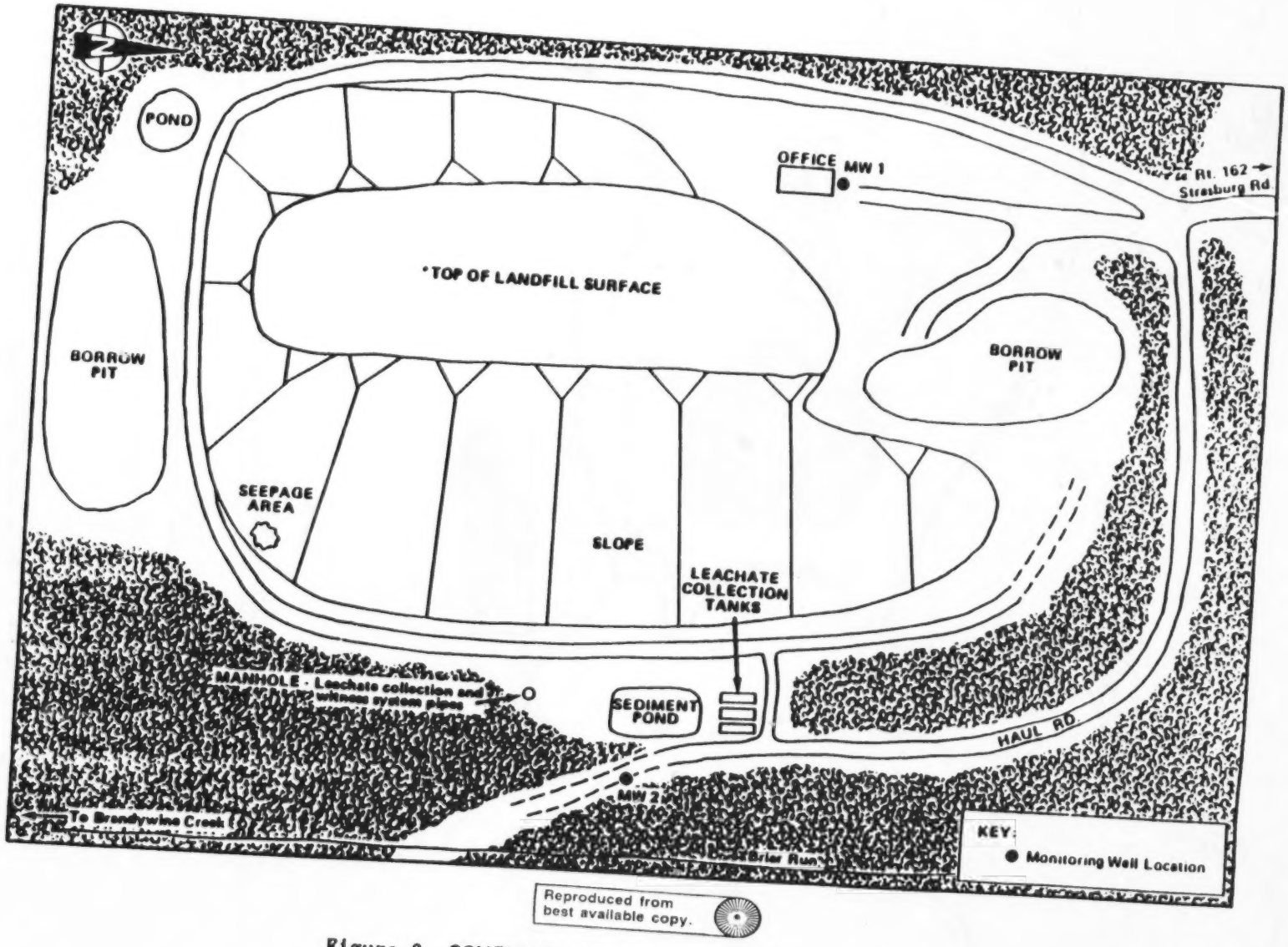

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Figure 2 SCHEMATIC SITE MAP OF STRASBURG LANDFILL

the landfill and is therefore the water-bearing formation of concern.

Wells completed in the Peters Creek Schist formation range in depth from 32 to 426 feet and have yields ranging from 0 to 312 gallons per minute.

Two-hundred-three private residences in the area draw water from private wells completed in the Peters Creek Schist formation. No municipal supply is currently available. The closest well to the site is 720 feet from the landfill.

Three public water supply companies are located within a 3-mile radius of the Strasburg Landfill, but all three draw their water from the Wissahickon Formation. The B & E public supply water company owns wells as close as 25 feet to the landfill property boundary. These wells serve two housing developments near the site.

A generalized profile of the landfill, based on details obtained from the PADER permit application and closure order, is shown in Figure 3. The actual construction has not been verified. The landfill is completely covered. A layer of soil covers the waste. On top of the soil is a 20 mil PVC cover to prevent infiltration of precipitation. On top of the PVC cover is another 2 feet of cover material. The eastern edge of the landfill is steep (greater than 8% slope) in areas and erosion is occurring such that the PVC liner is exposed in places. Vegetation density ranges from fairly thick grasses in some areas to non-existent in the erosion areas.

Below the waste material is a layer of screened soil about 2 feet thick. Within the screened soil is a network of perforated PVC pipe which drains leachate from the landfill. Beneath this leachate collection system is a 20-mil PVC liner, under which is another 2 feet of screened soil. Within this second layer of soil is another grid of perforated PVC pipe. This grid acts as a "witness system" to detect whether leachate is passing through the primary liner. Both the leachate collection system and the witness system drain to a manhole near the eastern boundary of the landfill. From the manhole, the leachate flows by gravity into two 5,000-gallon tanks in an unlined pit immediately east of the landfill. A third, inoperable tank is also located in the pit.

Below the witness system is a layer of MC-30, which is a bituminous coating that was sprayed on the surface of another 2-foot layer of screened soil. Within this layer of screened soil is a third set of PVC pipes used to prevent groundwater from rising into the landfill and infiltrating the liner. This drainage system discharges to the unlined sediment pond at the eastern boundary of the landfill.

A leachate seep area about 20 feet by 20 feet is found in the southeast area of the landfill, at the base of the landfill slope. The leachate flows from the seep area northeast to the eastern sediment pond.

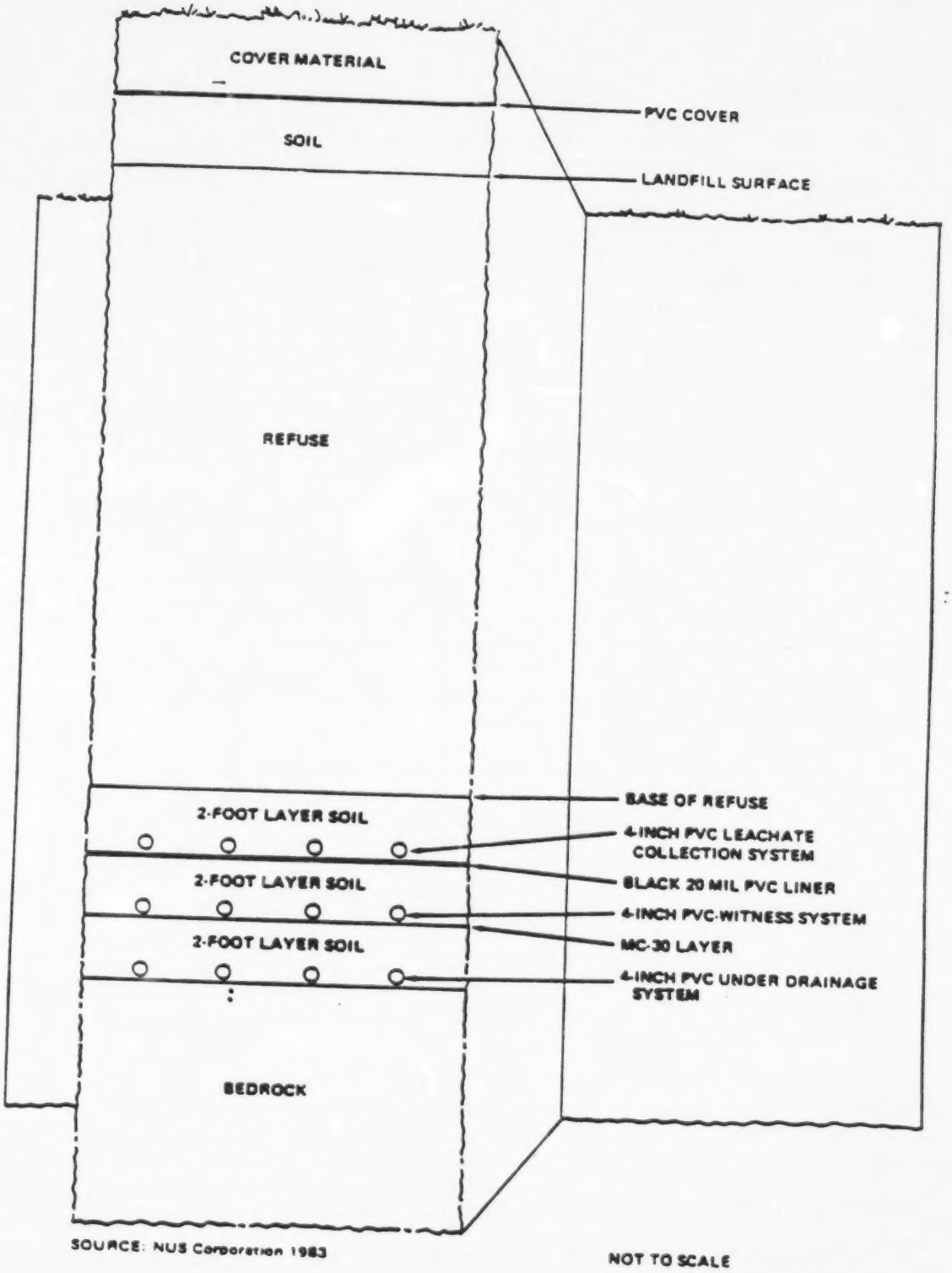

Figure 3 STRASBURG LANDFILL PROFILE SHOWING GROUNDWATER LEACHATE MONITORING SYSTEM

Site History

Strasburg Associates (SA) purchased the site in December 1973. In August 1975, SA received a PADER permit to accept municipal wastes at the 22-acre facility.

From 1976 through 1978, opening of the 22-acre landfill was delayed by issues between SA and the West Bradford Township concerning: 1) use of residentially zoned roads; 2) proposed sale of the landfill to Strasburg Landfill Associates (SLA); and 3) permitting of a proposed 200-acre expansion of the facility. SLA purchased the site in August 1978. In February 1979, the 22-acre landfill was opened. In the spring of 1979, new PADER permits were granted to SLA to receive certain industrial wastes and heavy metals. By December 1979, more than 1,000 cubic yards of polyvinyl chloride (PVC) wastes; 2,052 cubic yards of industrial wastes and sludges; and 35,000 gallons of heavy metal sludge had been accepted at the landfill (EPA Region III HRS 1986).

In December 1979, PADER charged SLA with causing excessive siltation of Briar Run Creek. In August 1980, PADER permanently prohibited the landfill from receiving industrial wastes. Municipal wastes were still accepted.

In 1980 the sampling of monitoring well M2 revealed three to eight parts per billion (ppb) of 1,1,1-trichloroethane. A sample of discharge water from the witness zone pipe in 1982 showed 245 ppb of 1,1,1-trichloroethane. In April 1983, leachate seeped at a rate of several gallons per minute from the southeast portion of the landfill. Discoloration was also noticed in a seep area near Briar Run, directly downhill of the southeast seep area. Water samples from the seep contained eight organic compounds (Meiser and Earl 1984).

In April 1983, PADER charged SLA with violations including runoff pollution, slopes in excess of allowed limits, failure to cover compacted wastes, and inadequate sedimentation and erosion controls. In May 1983, PADER suspended the Strasburg Landfill operating permit and ordered the landfill closed. As part of the closure plan, SLA regraded the landfill, covered it with 2 feet of soil topped by a PVC cover, stabilized the site with an additional two feet of soil and planted vegetation. The system to collect leachate and store it in the 5,000-gallon tanks was installed as a part of the closure plan. Collected leachate is currently transported by tank truck to an off-site treatment facility. Additionally, surface water runoff is now directed toward the sediment pond located near the eastern boundary of the site. A sediment pond in the southwest corner of the site is no longer used.

Prior to the installation of the leachate collection system, surface water runoff and leachate from the landfill was directed into the unlined sediment ponds located southwest and east of the landfill. It is believed that this collected leachate and runoff was dumped back onto the fill and/or was allowed to evaporate (T.H. Cahill and Associates 1983). Not all leachate and runoff has been handled in this manner. The sediment pond on the east side of the landfill discharges to Briar

Run via an overflow stack and pipe.

In August 1983, PADER analyses of water from well M2 and of leachate from the witness drain (see Table 1) revealed organic and inorganic contamination. In September 1983, analyses of water samples collected from M2, the witness drain, and Briar Run (see Table 2) revealed significant levels of toxic chemicals.

In October 1983, PADER collected water samples from four off-site private wells. Various organic compounds were detected in one of these wells, located southwest of landfill. The analytical results of the sample collected from this well are summarized in Table 3.

Subsequent to these findings, PADER required SLA to install additional monitoring wells, perform additional sampling, and prepare a hydrogeologic/engineering report evaluating the extent of groundwater contamination and possible remedial measures.

In February 1984, four additional monitoring wells were installed: three downgradient wells near the original well M2 (M2A, M2B, and M2C), and one well west of the landfill (M5) to be used to evaluate the extent of groundwater contaminant migration.

In July 1984, the hydrogeologic/engineering report evaluating the extent of groundwater contamination was completed (Meiser and Earl 1984). The six corrective measures delineated in the report included:

- Extending the PVC liner;
- Installing new leachate collector drains;
- Installing a 15-mil PVC membrane cap;
- Regrading soil to attain 2-1/2:1 or 3:1 final outslopes;
- Revegetating the sides and the top of the landfill; and
- Regrading soil to divert surface water away from the fill.

Implementation of these corrective measures was not completed. The eastern edge of the landfill is steep (greater than 8% slope) in areas, and erosion is occurring such that the PVC liner is exposed in places. Vegetation is non-existent in the erosion areas.

Several areas of seepage have been observed around the landfill. One large seep area (approximately 20 feet by 20 feet) is located near the southeast corner of the landfill at the base of the landfill slope. Liquid from the seep flows overland in a northeasterly direction until it is intercepted by a drainage ditch. The ditch drains into the sediment pond near the eastern boundary of the landfill. Reddish-brown stains are present along the drainage path from the seep to the eastern sediment pond. A drainage channel extends from the eastern sediment pond eastward into the woods towards Briar Run. During heavy rainfall, sediment pond overflows into Briar Run have been documented (NUS 1983).

Table 1

SUMMARY OF ANALYTICAL RESULTS FOR SAMPLES
COLLECTED FROM WELL M2 AND
WITNESS DRAIN PIPE,
PADER, AUGUST 1, 1983
(ug/L)

Compound	Witness Drain Pipe	Well M2
Chloroethane	27	7
Chloroethene	126	8
1,2-Dichloroethane	11	--
1,1-Dichloroethane	109	16
1,2-Dichloroethene	140	3
1,1-Dichloroethene	--	10
1,1,1-Trichloroethane	6	47
Trichloroethene	9	3
Tetrachloroethene	--	14
Chloromethane	2	2
Dichloromethane	86	3
Dichlorofluoromethane	--	Trace
Trichlorofluoromethane	Trace	9
Benzene	34	2
Toluene	76	Trace
Ethyl benzene	12	--
Chlorobenzene	4	--

Source: T.H. Cahill and Associates, 1983.

Table 2

SUMMARY OF ANALYTICAL RESULTS FOR SAMPLES
COLLECTED FROM WELL M2, THE WITNESS DRAIN PIPE,
AND BRIAR RUN,
PADER, SEPTEMBER 6, 1983
(ug/L)

Compound	Well M2	Witness Drain Pipe	Briar Run
Chloroethane	8.7	6.7	--
Chloroethene	18	Estimate 180	2.2
1,2-Dichloroethane	1.2	13	--
1,1-Dichloroethane	22	Estimate 150	1.5
1,2-Dichloroethene	9	100	1.7
1,1-Dichloroethene	8.4	2.1	--
1,1,1-Trichloroethane	65	16	1.5
Trichloroethene	4.1	2.4	Trace
Tetrachloroethene	18	5.8	Trace
Chloromethane	--	--	--
Dichloromethane	4.6	34	--
Dichlorofluoromethane	Trace	--	--
Trichlorofluoromethane	3.7	--	--
Benzene	6.2	47	1.0
Toluene	1.0	97	1.0
Ethyl benzene	--	19	--
Chlorobenzene	--	3.8	--

Source: T.H. Cahill and Associates, 1983.

Table 3

ANALYTICAL RESULTS OF THE SAMPLE
COLLECTED FROM
AN OFF-SITE
RESIDENTIAL WELL,
PADER, OCTOBER 14, 1983
(ug/L)

Compound	Residential Well
Chloroethane	--
Chloroethene	0.9
1,2-Dichloroethane	--
1,1-Dichloroethane	7.8
1,2-Dichloroethene	3.4
1,1-Dichloroethene	--
1,1,1-Trichloroethane	3.3
Trichloroethene	5.8
Tetrachloroethene	9
Chloromethane	--
Dichloromethane	8.5
Dichlorofluoromethane	Trace
Trichlorofluoromethane	--
Benzene	--
Toluene	--
Ethyl benzene	--
Chlorobenzene	--

Source: T.H. Cahill and Associates, 1983.

Recent analytical results of seep water from near Briar Run and leachate from a manhole near the sediment pond are shown in Table 4. A sample from Briar Run, approximately 200 yards downstream of the sediment pond outfall, in March 1988, showed toluene (1.3 ppb) and cis-1,2-dichloroethylene (1.0 ppb) (PADER 1988).

PADER has conducted quarterly monitoring of the residential drinking water wells in a southerly direction from the landfill since October of 1983. As part of the monitoring program, PADER has sampled and analyzed water for volatile organic compounds from approximately 30 residential drinking water wells. Three residential drinking water wells have shown multiple organic contaminants. Table 5 is a list of organic compounds and the highest concentration detected in the residential water wells during 1987 and 1988 samples.

In March of 1989, the Strasburg Landfill Site was added to the National Priorities List (NPL) after receiving a Hazard Ranking Score (HRS) of 30.71. An HRS of more than 28.5 is required for inclusion to this list of the nation's most serious hazardous waste sites. Because the Strasburg Landfill Site is an NPL site, it is eligible for long-term Superfund Remediation.

Enforcement History

In August 1975, PADER granted SA a permit to operate a 22 acre landfill. The opening was delayed until February 1979 because of local concerns over the use of residentially zoned roads, the proposed sale of the landfill to SLA and permitting of a proposed 200 acre expansion.

In the Spring of 1979 new PADER permits were granted to receive certain industrial wastes. By July 1979, SLA was accepting sewage treatment plant sludge and PVC manufacturing wastes. In December 1979, PADER prohibited the disposal of certain industrial wastes because the waste characteristics did not match those on the approved waste disposal application module. Also in December 1979, PADER fined SLA for improper surface run-off and sediment control. PADER temporarily suspended industrial waste disposal at SL in March 1980, and permanently prohibited industrial waste disposal in August 1980. Between January and June 1981, PADER cited SLA for operational problems (dust control, daily cover, and litter control) at the landfill.

PADER conducted periodic inspections, both announced and unannounced, during the landfill operation. During an unannounced inspection in April 1983, PADER found four major operating violations: improper run-off control; slopes in excess of allowed limits; failure to cover compacted waste; and inadequate sedimentation and erosion control. PADER issued SLA a notice of violation and required that the violations be corrected within 30 days. The violations were not corrected within the specified time. In May 1983, PADER suspended the landfill operating permit and ordered the landfill closed. SLA closed the landfill in May 1983, by providing a final soil cover, a PVC cover, stabilized the site with an additional layer of soil, planted vegetation, and installed a leachate storage tank system. PADER also issued an order requiring SLA

Table 4

SUMMARY OF ANALYTICAL RESULTS FOR
SEEP AND LANDFILL LEACHATE SAMPLES
(ug/L)

Compound	Seep East of Sediment Pond	Landfill Leachate
Vinyl Chloride	10	20
1,1-Dichloroethane	30	--
trans-1,2-Dichloroethylene	1.0	--
1,2-Dichloroethane	4.3	--
1,2-Dichloropropane	2.9	--
Trichloroethylene	3.4	--
Benzene	2.2	10
Toluene	8.4	280
Chlorobenzene	26	15
Xylenes	2.0	Est. 950
cis-1,2-Dichloroethylene	35.0	13
1,4-Dichlorobenzene	7.8	Est. 50
1,2-Dichlorobenzene	1.0	--
Chloroethane	—	12
Ethylbenzene	—	130

Source: PADER, March 9, 1988.

Table 5

LIST OF CONTAMINANTS FOUND IN
RESIDENTIAL DRINKING WATER WELLS
(ug/L)

Contaminant	Maximum Detected Concentration
Benzene	3.4
Chlorobenzene	1.4
Chloroform	1.7
1,1-Dichloroethane	16.0
1,2-Dichloroethane	1.3
cis-1,2-Dichloroethylene	413.9
1,2-Dichloropropane	1.2
1,1,1-Trichloroethane	2.5
Trichloroethylene	35.8
1,1,2,2-Tetrachloroethylene	3.5
Vinyl chloride	2.5

Source: PADER 1987-1988.

to remove collected leachate for off-site treatment and disposal.

During sampling by PADER in October 1983, volatile organic compounds were detected in off-site residential drinking water wells. Based on their findings, PADER implemented a periodic monitoring program of the residential drinking water wells.

In August 1986, EPA prepared an HRS package to determine the Strasburg Landfill site eligibility for proposal to the NPL. The Strasburg Landfill was proposed to the NPL on Update #7, in May 1988. At that time, EPA conducted a potentially responsible party (PRP) search. As a result of this investigation, EPA compiled a list of notice letter candidates. Additional information on enforcement activities is included in Attachment B.

Nature and Extent of Contamination

This section will focus on the contaminants that may pose hazards to the public health due to the release of leachate from the major seep area at the southeast corner of the landfill and the contaminated drinking water supply.

Leachate Seep

The leachate from the seep at the southeast corner of the landfill has not yet been directly sampled and analyzed; however, data are available on landfill leachate collected from a manhole near the sediment pond and a seep located between the sediment pond and Briar Run Creek. Recent analytical results for samples of these materials are given in Table 4. These materials are presumably derived from the same general source as the liquid from the seep at the southeast corner of the landfill and may exhibit similar contamination patterns.

The liquid discharging from the southeast seep flows overland in a northeasterly direction to a drainage ditch that empties into the sedimentation pond immediately east of the landfill. During heavy rains, the sedimentation pond overflows and discharges via an overflow stack running eastward from the pond through the woods and into Briar Run, which in turn flows into Brandywine Creek. Liquid discharged from the southeast seep may also migrate to groundwater via infiltration at various points along the overland flow pathway. Groundwater movement in the area is mainly via fractures in the Peters Creek Schist Formation.

Potential pathways of exposure to the seep material include the following:

- Direct contact (including dermal and oral exposure) with the seep material by workers on-site and by members of the general population (adults and children) who might enter the site for miscellaneous purposes; for example, children playing in the area;

- Inhalation of volatile organics emitted from the seep material and soils along the overland flow pathway by on-site workers and

members of the general population that may come into close proximity to the seep material on its overland flow pathway; and

- Dermal, oral, and inhalation exposure to contaminants that might reach Briar Run or the Brandywine Creek by members of the general population using the Brandywine for recreational purposes such as canoeing, tubing, swimming, bathing, wading, fishing, or as a drinking water source.

The seep material may also have infiltrated the ground and reached the groundwater which is used as a water supply source by 203 residences in the vicinity of the landfill.

Contaminated Water Supply

A number of hazardous volatile organic contaminants have been detected in groundwater derived from domestic wells in the vicinity of the site. Multiple contaminants have been detected in three out of 25 residential water supplies that were sampled during 1987 and 1988. The contaminant concentrations are summarized in Table 6.

There are a variety of exposure pathways to the contaminated groundwater which, most notably include:

- Ingestion of groundwater by drinking;
- Inhalation and dermal absorption, or ingestion of contaminants during showering or bathing; and
- Inhalation and dermal absorption or ingestion of contaminants as a result of other household use of groundwater.

Of those listed above, the first two sets of water-related exposure pathways are expected to be most important. Drinking water ingestion is a major exposure pathway because substantial amounts of contaminated water may be consumed. Showering and bathing result in significant exposures due to inhalation of contaminants volatilized from the water at typical shower temperatures, and the large skin surface area subject to dermal absorption.

Public Health Evaluation

The contaminants in the landfill leachate and seeps (Table 4) and in the residential water supplies of the affected homes (Table 6) consist of a variety of hazardous volatile organic compounds. This section provides a summary of the potential risks to human health from these contaminants in the absence of any remedial action.

Leachate Seep

Since the southeast seep has not yet been analyzed directly, it was determined to be inappropriate to attempt to quantitatively estimate potential exposures and risks resulting from direct contact with seep

Table 6

CONCENTRATIONS OF CONTAMINANTS IDENTIFIED IN RESIDENTIAL DRINKING WATER WELLS

Contaminant	Number of Times Detected(1)	Average Detected Concentration (ug/L)	Maximum Detected Concentration (ug/L)
Benzene	1	3.40	3.4
Chlorobenzene	1	1.40	1.4
Chloroform	1	1.70	1.7
1,1-Dichloroethane	7	6.26	16.0
1,2-Dichloroethane	1	1.3	1.3
cis-1,2-Dichloroethylene	7	90.2	413.9
1,2-Dichloropropane	1	1.2	1.2
1,1,2,2-Tetrachloroethane	7	14.9	35
1,1,1-Trichloroethane	7	1.69	2.5
Trichloroethylene	7	14.57	35.8
Vinyl Chloride	2	2	2.5

(1) Total number of times the contaminants were observed in residential water supplies tested by PADER during 1987 and 1988. This number may include multiple observations of the same contaminants in the same residences on different sampling occasions.

Source: PADER 1987-1988.

material, inhalation of volatile contaminants emitted by the seep material or soils in contact with those materials, or recreational or other uses of the Brandywine Creek. Eight of the thirteen contaminants found in the seep east of the sedimentation pond have also been found in the domestic water supplies of residences in the vicinity of the landfill. This suggests that seepage from the landfill may have contributed to contamination in these water supplies. The hydrogeology of the area has not been sufficiently characterized to permit a quantitative estimate to be made of the extent to which the southeast seep may have contributed to the groundwater contamination found in nearby residential wells.

Contaminated Water Supply

The groundwater in the vicinity of the Strasburg Landfill Site has a significant potential adverse health impact on the affected homes presently using the groundwater for domestic water supply purposes. Both the drinking water and showering exposure pathways evaluated in the FFS contributed significantly to the estimated risks associated with using the contaminated groundwater.

Exposure estimates and hazard and risk estimates corresponding to two exposure scenarios were prepared based on the Superfund Public Health Evaluation Manual (SPHEM) (U.S. EPA, October 1986). The first scenario uses the average concentrations found in the residential wells and was assumed to represent a typical exposure level, based on current information. The second scenario uses the maximum concentration found in any of the residential wells, and was assumed to represent a reasonable worst-case scenario. Additionally, for risk assessment purposes, groundwater contaminants detected in the residential drinking water wells were divided into potential carcinogens and noncarcinogens according to EPA weight-of-evidence criteria. Table 7 summarizes EPA's classification of the 11 contaminants of concern.

Under the typical exposure scenario, the aggregate hazard index for the noncarcinogenic contaminants is less than 1; therefore, no adverse noncarcinogenic health effects would be expected. The aggregate carcinogenic risk, however, was 4.13×10^{-4}, or about 1 in 2,400. This aggregate carcinogenic risk is 400 times greater than the 1×10^{-6} (one in a million) lifetime cancer risk level proposed by the EPA as a point of departure for selecting acceptable carcinogenic risk levels at hazardous waste sites. Under the reasonable worst-case scenario, the aggregate hazard index was 37.2, indicating that noncarcinogenic adverse effects may be possible. The aggregate carcinogenic risk was 7.45×10^{-4}, or about 1 in 1,350 (700 times greater than the EPA 1×10^{-6} proposed risk level).

Target groundwater concentrations for the potentially carcinogenic contaminants would be such that the aggregate carcinogenic risk would be less than 1×10^{-6}. Table 8 provides one combination of concentrations corresponding to an aggregate risk of 1×10^{-6} in which the risk is divided equally among the contaminants. These are calculated, health based, values and some of the concentrations may fall below the detection limit of standard EPA analytical methods.

Table 7

CARCINOGENICITY CLASSIFICATION OF CONTAMINANTS
ACCORDING TO
EPA WEIGHT-OF-EVIDENCE CRITERIA

Contaminant	EPA Carcinogenicity Weight-of-Evidence Category
Benzene	A
Chlorobenzene	D
Chloroform	B2
1,1-Dichloroethane	C
1,2-Dichloroethane	B2
1,2-Dichloroethene(cis)	D
1,2-Dichloropropane	C
1,1,2,2-Tetrachloroethane	C
1,1,1-Trichloroethane	D
Trichloroethene	B2
Vinyl chloride	A

Source: EPA 1986a

Key:

A = Human Carcinogen - sufficient evidence from epidemiological studies

B2 = Probable Human Carcinogen - usually a combination of sufficient evidence for animals and inadequate data for humans

C = Possible Human Carcinogen - limited evidence of carcinogenicity in animals in the absence of human data

D = Not Classified - inadequate animal evidence of carcinogenicity

Table 8

TARGET GROUNDWATER CONCENTRATIONS CORRESPONDING TO AN AGGREGATE CARCINOGENIC RISK OF 1×10^{-6}

Contaminant	Concentration (ug/L)
Benzene	0.045
Chloroform	0.028
1,1-Dichloroethane	0.048
1,2-Dichloroethane	0.017
1,2-Dichloropropane	0.064
1,1,2,2-Tetrachloroethane	0.010
Trichloroethene	0.123
Vinyl Chloride	0.0014

Source: Ecology and Environment 1989.

Target groundwater concentrations for the noncarcinogenic contaminants would be such that the aggregate hazard index would be less than 1 (indicating no adverse noncarcinogenic health effects would be expected). Reduction of the concentration of cis-1,2-dichloroethene to less than 11.1 ug/L would reduce the hazard index under the worst-case scenario to less than 1.

Drinking water standards and criteria which may also be considered in selecting the target groundwater concentrations for potential remedial measures are given in Table 9.

Community Relations

A formal Community Relations Plan will be developed during the project planning stage of the RI/FS. An information repository was established at the Coatesville Area Public Library and an Administrative Record is available there for public review.

In relation to the Focused Feasibility Study (FFS), some community relation activities have occurred. The public notice of EPA's proposed plan, to address items in the FFS, was published on April 24, 1989. A thirty-day public comment period on the FFS began on April 24, 1989 and extended to May 24, 1989. A public meeting was held on May 17, 1989 at the Po Mar Lin Fire Company in Unionville, PA. A transcript of the public meeting was placed in the Administrative Record. Questions and comments received during the public comment period and presented at the public meeting are discussed in the responsiveness summary.

Applicable, Relevant and Appropriate Requirements (ARARs)

The remedial action alternatives selected for the two problem areas of concern (the leachate seep and the contaminated water supply) must meet or exceed all applicable, relevant and appropriate requirements (ARARs) unless a waiver provided by CERCLA Section 121 (d) (4) and 42 USC 9621 (d) (4) is invoked.

Remedial action alternatives for the leachate seep are not intended as final remedial actions for the site. ARARs are waived (40 USC 9621 [c] [4] [a]) for the on-site portion because it is only part of a total remedial action alternative to be developed in the upcoming RI/FS. Offsite disposal requirements will comply with all RCRA transport and disposal regulations.

For the contaminated water supply, the maximum contaminant levels (MCLs) established under the Safe Drinking Water Act constitute ARARs. EPA health advisories and 1×10^{-6} cancer risk concentrations are to-be-considered (TBC) guidance for the FFS.

Description of Alternatives

Two Remedial Action Alternatives (RAAs), including the no-action alternative, were developed for the leachate seep area and three RAAs including the no-action alternative were developed for the contaminated water supply.

Table 9

DRINKING WATER STANDARDS AND CRITERIA
FOR RESIDENTIAL WELL CONTAMINANTS

Contaminant	Safe Drinking Water Act MCL (ug/L)	Drinking Water Health Advisories Chronic (ug/L)	Lifetime 10^{-6} Cancer Risk Concentration for Individual Compounds in Drinking Water (ug/L)
Benzene	5.0	--	1.2
Chlorobenzene	--	300	--
Chloroform	100	--	5.7
1,1-Dichloroethane	--	1,400	0.38
1,2-Dichloroethane	5.0	--	0.38
cis-1,2-Dichloroethylene	--	70	--
1,2-Dichloropropane	--	--	0.51
1,1,2,2-Tetrachloroethylene	--	--	0.18
1,1,1-Trichloroethane	200	200	--
Trichloroethylene	5.0	--	3.2
Vinyl Chloride	2.0	--	0.015

Source: 40 CFR 141 and EPA 1986a.

Description of Alternatives For Leachate Seep

Alternative 1: No-Action.

As mandated by SARA, EPA is required to review a no-action alternative for any anticipated task designed to remediate a site.

Under the no-action alternative, the groundwater and surface water monitoring program implemented by the PADER would be continued. The groundwater monitoring would track migration of contaminants from the landfill and monitor water quality in the area homes. No active remedial measures would be employed.

Alternative 2: Collect Leachate and Treat Off-Site

The components of Alternative 2 are summarized as follows:

- Excavate a ditch below the leachate seep approximately 25 feet long, 5 feet wide, and 2 feet deep. All material excavated from the ditch will be properly containerized for off-site disposal at a RCRA authorized facility;
- Install interceptor drain in the excavated ditch;
- Connect the interceptor drain to the existing leachate collection and storage tank system, with a 4-inch solid PVC pipe, through the existing leachate collection system manhole (assume material excavated during pipe installation can be used as backfill over the pipe); and
- Assume current disposal arrangements, including the transport of leachate to a RCRA authorized treatment facility, will continue.

Figure 4 shows the details of Alternative 2.

Description of Alternatives for Contaminated Water Supply

Alternative 3: No-Action

The discussion provided for the previous no-action alternative for the leachate seep also describes the no-action alternative for the water supply operable unit. Groundwater and residential water supplies would continue to be monitored, but no active remedial measures would be taken.

Alternative 4: Point-of-Use Treatment with Activated Carbon

This alternative involves installation of activated carbon treatment systems (see Figure 5) at the affected residences. These systems would treat all water entering the house distribution systems. Canisters containing activated carbon would be placed directly inside the houses, in-line after the house pressure tank. Design assumptions are as follows:

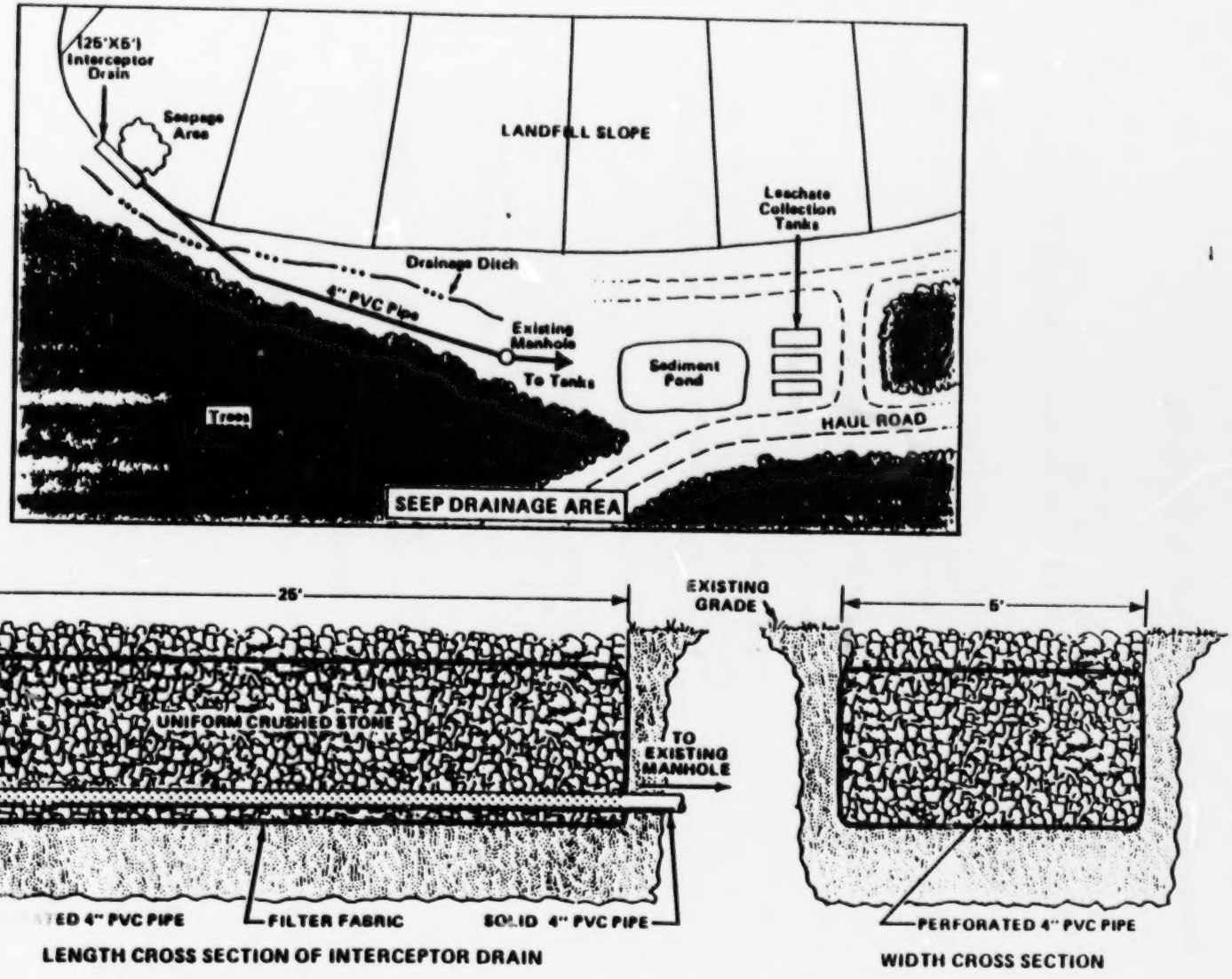

Figure 4 DETAILS OF ALTERNATIVE 2

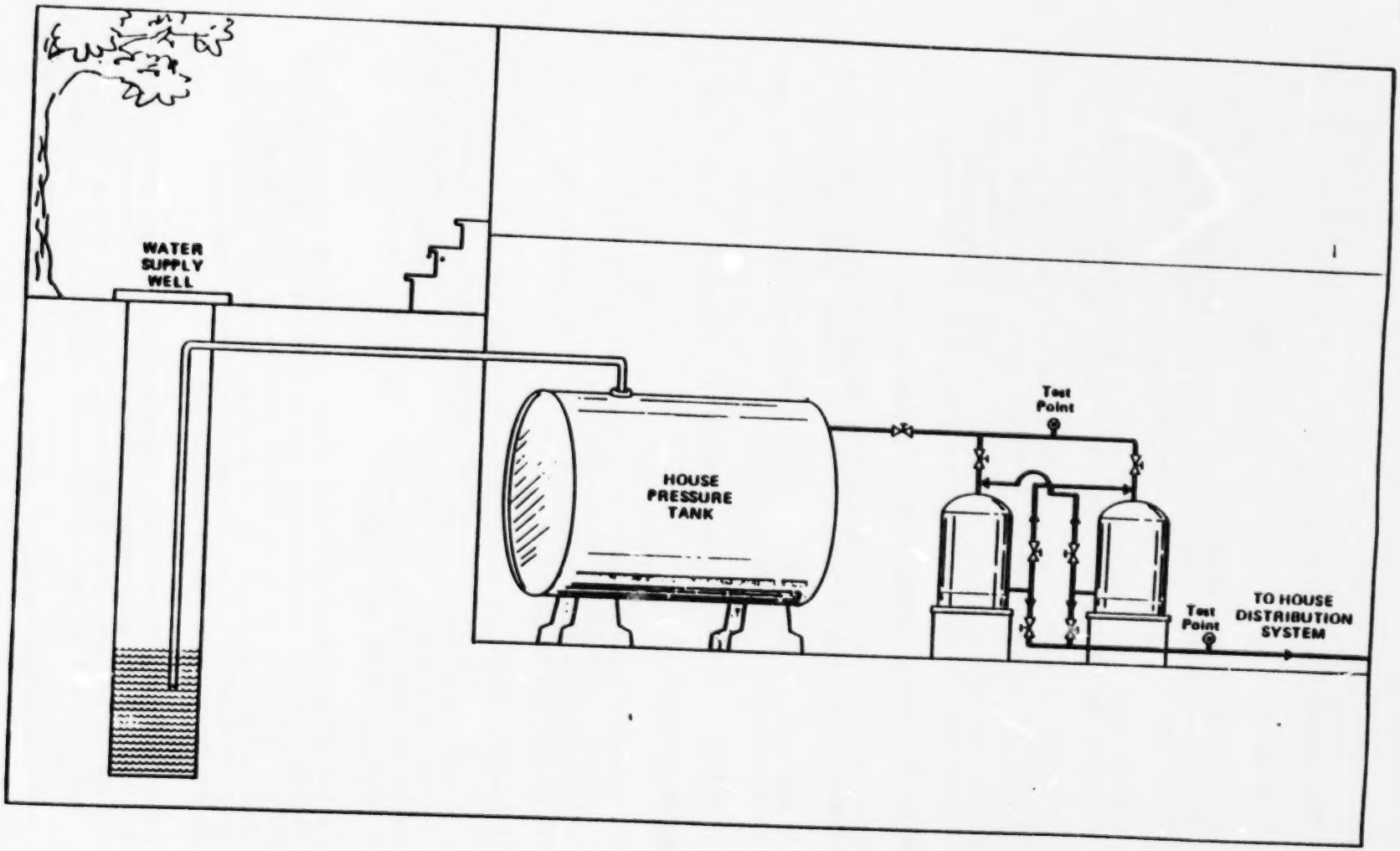

Figure 5 TWO-VESSEL ACTIVATED CARBON ADSORPTION SYSTEM

- Two canisters operating in series;
- Flow capacity of 7 gallons per minute (gpm);
- Canister configuration may be switched to more economical parallel operation as contaminant concentrations are reduced over time, allowing 14 gpm flow capacity;
- Carbon usage rate (calculated based on adsorption isotherm data) is approximately 1,150 lbs of carbon per year.

Final design of the carbon treatment units will be based on capacity and configuration of the house water supply, water usage rates, and contaminant concentrations in the influent. It is recommended that treatability test be run using contaminant concentrations found in the local groundwater in order to determine actual carbon usage rates.

Alternative 5: Extend Community Water Supply System

This alternative involves extending a community water supply system to the homes affected by contaminated drinking water (see Figure 6).

Table 10 provides a summary of the costs associated with the RAAs. All costs are presented in 1989 dollars.

Table 11 addresses the nine criteria which EPA considers for each RAA.

Recommended Alternative

EPA's preferred alternatives for remediation of the Strasburg Landfill Site are Alternative #2 for remediation of the leachate/sediment pond and alternative #4 for contaminated well remediation (see Figures 4 and 5).

The leachate seep control alternative, to collect and pipe the leachate to the existing collection and storage system, is preferred because it meets established remedial action objects with regard to human health and the environment. The components of this alternative are well demonstrated and represent a reliable and cost effective method for leachate seep collection and disposal.

The point-of-use activated carbon treatment alternative is preferred because the alternative meets established remedial action objectives by providing an effective, reliable treatment method to reduce potential human health risks from ingestion, inhalation and dermal adsorption of contaminated groundwater. The treatment units are commercially available and can be installed in a short time.

By reducing volume and toxicity, these alternatives are protective of human health and the environment, and comply with all appropriate ARARs, are cost effective, utilize permanent solutions to the maximum extent practicable and satisfy the statutory preference for permanent reduction of toxicity, mobility, or volume. The alternatives will also provide long-term effectiveness if properly maintained.

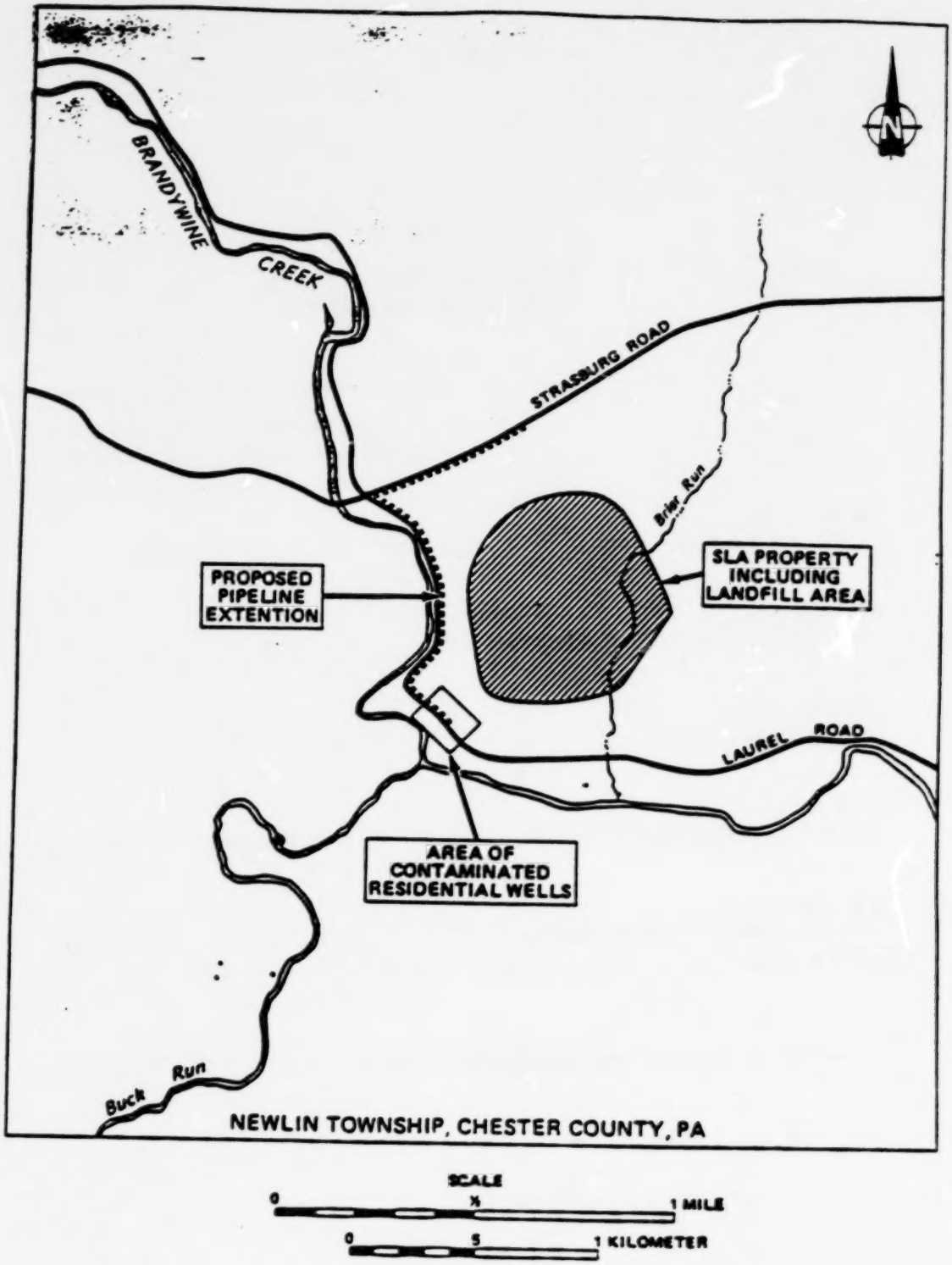

Figure 6 PROPOSED COMMUNITY WATER SUPPLY EXTENSION OF B & E WATER COMPANY SYSTEM FOR ALTERNATIVE GW3

Table 10

SUMMARY OF REMEDIAL ACTION
ALTERNATIVE (RAA) COSTS

	Estimated Capital Costs	Estimated O & M Costs
Alternative 1 Leachate Seep-No-Action	$0	$0
Alternative 2 Collect/Leachate/Treat Off-Site	$32,320	$0
Alternative 3 Water Supply-No-Action	$0	$0
Alternative 4* Point-of-Use/Carbon Treatment	$3,500/home	$1,500/year/home
Alternative 5 Extend Community Water Supply	$297,950	$350/year

* - Currently 3 homes are being considered for Point-of-Use treatment.

Table 11

SUMMARY OF DETAILED EVALUATION OF REMEDIAL ALTERNATIVES

Remedial Alternatives	Compliance With ARARs	Permanent Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Long-Term Effectiveness and Permanence	Implementability	Cost	Community Reaction	State Acceptance	Protection of Human Health and the Environment
Leachate Seep									
Alternative 1									
No Action	o Not applicable to the leachate seep	o Will not meet the statutory preference for selecting remedial actions that permanently and significantly reduce toxicity, mobility, or volume of hazardous substances	o Groundwater and surface water monitoring program is already implemented; therefore, there would be no short-term effect on the environment and human health	o Will not prevent contaminant migration o Continued possible migration of contaminants to groundwater and surface water o Long-term environmental threats will persist o Does not meet established remedial objectives o Public health response objectives are not met	o Monitoring program is already in existence	o None	o Will not prevent leachate seep contaminant migration, and the long-term environmental threats will persist	o Would not be acceptable to concerned state agencies	o Long-term human health and environmental threats will persist
Alternative 2									
Collect Leachate and Treat Off-Site	o Not applicable to the leachate seep	o Treatment of collected leachate at an off-site facility will significantly reduce its toxicity, thus meeting this statutory preference	o Short-term public health and environmental effects will be negligible, provided adequate dust control measures are taken and OSHA procedures are followed o Construction time is approximately 2 weeks	o Effective method for leachate collection o Removes collected leachate from the site o Provides for treatment of leachate to reduce toxicity o Meets established	o Components of this alternative have been well-demonstrated and together represent a reliable method for leachate seep collection and disposal	o Estimated total capital costs are $52,520	o Meets established remedial objectives o Remedial objectives addressing the entire site will be developed and evaluated in the subsequent RI/FS	o Would be acceptable to concerned state agencies	o Meets established remedial objectives with regard to human health and the environment
Contaminated Water Supply									
Alternative 3									
No Action	o Will not meet identified ARARs	o Will not meet the statutory preference for selecting remedial actions that permanently and significantly reduce toxicity, mobility, or volume of hazardous substances	o Groundwater and surface water monitoring program is already implemented; therefore, there would be no short-term effect on the environment and human health	o Contaminated drinking water supplies to houses on Laurel Road would continue o Does not meet established remedial objectives o Public health response objectives are not met	o Monitoring program is already in existence	o None	o Public health objectives are not met	o Would not be acceptable to concerned state agencies	o Long-term human health risks from ingestion and dermal absorption of contaminated ground water will persist

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Table II (Cont.)

Remedial Alternatives	Compliance With ARARs	Permanent Reduction of Toxicity, Mobility, or Volume	Short-term Effectiveness	Long-term Effectiveness and Permanence	Implementability	Cost	Community Reaction	State Acceptance	Protection of Human Health and the Environment
Alternative 4									
Point-of-Use Activated Carbon Treatment	o Meets identified ARARs	o Carbon adsorption and subsequent regeneration of the spent carbon will meet this statutory preference	o No short-term effects on human health and the environment o Time to purchase and complete installation of units in homes estimated at 2 to 4 weeks	o Activated carbon is an effective technology for removal of organics o Reliable method for providing safe drinking water if regular maintenance schedule is followed o Will reduce potential risks to human health from ingestion and dermal adsorption of contaminated groundwater	o Commercially available and widely used method for treating home drinking water supplies	o Capital costs relatively low, O&M costs moderately high due to carbon usage rate	o Regular maintenance schedule required o Periodic sampling of the treated water will be conducted by the state to insure effective operating of the system	o Would provide an acceptable alternative	o Meets established remedial objectives
Alternative 5									
Extend Community Water Supply	o Meets identified ARARs	o Will not meet this statutory preference	o Short-term effects on human health and environment will be negligible, provided OSHA standards are followed during construction o Time to design and construct estimated at minimum of 6 months	o Will reduce potential risks to human health from ingestion and dermal adsorption of contaminated groundwater	o Relies on standard engineering and design practices and is a proven method of supplying water for domestic use o Operation and maintenance handled by water authority o Potential delays may be caused by time to obtain rights-of-way and by technical and financial negotiations between concerned parties	o Capital costs relatively high, user costs relatively low compared to point-of-use treatment	o Provides a source of quality potable water o Actual construction activities on the homeowners' property would be approximately 2 days	o Would provide an acceptable alternative	o Will reduce potential risks to human health from ingestion and dermal adsorption of contaminated groundwater

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Attachment A

Strasburg Landfill, Newlin Township, Pennsylvania
Responsiveness Summary

A. Overview

EPA Region III has proposed implementing an expedited response action at the Strasburg Landfill to address two concerns: control of a leachate seep on the southeast side of the landfill; and providing an alternate water supply for affected residences. A Focused Feasibility Study (FFS) was completed to evaluate remedial measures for the two issues. The preferred alternative specified in the Record of Decision (ROD) for control of the leachate seep is installation of an interceptor trench and connecting the trench into the existing leachate collection and storage tank system. Currently, leachate is removed daily and transported by tank truck to a RCRA authorized treatment facility. The preferred alternative specified in the ROD for provision of an alternate water supply to affected residences is point-of-use activated carbon treatment units.

From the minor comments received during the public comment period and the public meeting, the residents and local government officials of Newlin Township and West Bradford Township support implementation of the preferred alternatives specified in the ROD.

B. Background on Community Involvement

Community interest in the Strasburg landfill site dates to the fall of 1983 when volatile organic compounds were detected in off-site residential drinking water wells. The Newlin Township and West Bradford Township residents and government officials are concerned about the impact the landfill may have on groundwater, the area drinking water source, air and surface water in the area of the site. The impacts to these media will be addressed during completion of the Remedial Investigation/Feasibility Study.

C. Summary of Comments Received During Public Comment Period

A public comment period on the FFS was held from April 24, 1989 to May 24, 1989. A public meeting was also held at the Po Mar Lin Firehouse in Unionville, Pennsylvania on May 17, 1989.

One comment concerning the FFS was received during the public comment period and one comment concerning the FFS was received at the public meeting. The two comments and responses are summarized below:

1. The Chester County Health Department made a comment about the design of the proposed interceptor trench.

EPA Response: As the remedial design of the interceptor trench has not been initiated, the comment raised will be considered during the remedial design process.

2. A local resident commented at the public meeting on the decision to install the individual activated carbon treatment units rather than extending a public water supply system.

EPA Response: At this point, the economics favor installation of individual activated carbon treatment units. However, if additional residential drinking water wells are found to be affected, the economics of purchase and installation of individual treatment units versus extending a community water system will be reevaluated.

Community Relations Activities at the Strasburg Landfill

Community relations activities conducted at the Strasburg landfill site to date have included:

- An information repository, which was established at the Coatesville Area Public Library (April 1989).
- A public notice, published by EPA, of the proposed plan to address items in the FFS (April 1989).
- A public meeting, held by EPA, at the Po Mar Lin Firehouse in Unionville, Pennsylvania on May 17, 1989, to inform area residents and local government officials of the expedited response action and to obtain their comments. A transcript of the meeting is available at the Coatesville Area Public Library.

Attachment B

Enforcement History

The Strasburg Landfill Site was proposed to the National Priorities List on Update #7, in May 1988. At that time, EPA conducted a potentially responsible party (PRP) search. As a result of this investigation, EPA compiled a list of 26 notice letter candidates.

EPA issued "special" notice letters (SNL) on October 7, 1988, inviting the parties to participate in a Remedial Investigation/ Feasibility Study (RI/FS) at the site. A sixty day moratorium followed, during which time the PRPs were encouraged to indicate to EPA whether or not they were willing to participate in the RI/FS. Of the parties who received SNLs, two (Downingtown Regional Water Pollution Control Board and West Chester Area School District) indicated a willingness to cooperate, however, they wished to be considered as "de minimus" parties. Twelve other parties (Alex Barry, Buckley & Co., Somerset Strippers of Virginia, E.I. Dupont de Nemours & Co., Hercules, Inc., Leksi Co., Maxus Energy Corp., Occidental Electrochemicals Corp., West Chester Goose Creek Treatment Plant, West Goshen Township, Delaware Container Corp., and Eldredge, Inc.) declined to participate, and the remainder provided no response.

Since no viable PRPs agreed to perform the RI/FS, the site was transferred to the Superfund Branch for a fund-lead RI/FS. A second round of SNLs were sent out on May 2, 1989 for the Proposed Plan which calls for the collection and treatment of leachate from the seep area and the installation of activated carbon treatment systems at the affected residences. The sixty day moratorium commenced on May 11, 1989, allowing the PRPs the opportunity to come forward and finance the proposed remedial alternatives. If, after sixty days, EPA receives a negative response (or no response) from the PRPs, EPA will either pursue Section 106 enforcement action against the PRPs or finance the remediation of this operable unit.

On May 10, 1989, a federal lien was filed in the United States District Court, Eastern District of Pennsylvania, against Strasburg Landfill.